Linzer biol. Beitr.	47/1	711-730	31.7.2015

Classification, Natural History, and Evolution of the Enopliinae GISTEL (Coleoptera: Cleridae). Part IV. The New World genus *Pyticara* SPINOLA

Weston OPITZ

A b s t r a c t : The checkered beetle genus *Pyticara* SPINOLA is revised for the first time. The genus contains the following species: *Pyticara batesiana* (GORHAM), *Pyticara championi* GORHAM, *Pyticara duponti* SPINOLA, *Pyticara implana* Opitz, nov.sp., *Pyticara lineatohumeralis* PIC, and *Pyticara simoata* OPITZ, nov.sp. Lectotypes are designated for *Pyticara batesiana*, *Pyticara championi*, and *Pyticara lineatohumeralis*. Three new synonymies are established: *Ichnea batesiana var. pelonioides* GORHAM (= *Pyticara batesiana* GORHAM) and *Pyticara coronata* Gorham and *Pyticara flavicollis* GORHAM (= *Pyticara duponti* SPINOLA). A Neotype for *P. duponti* SPINOLA has been selected. The morphology of these beetles suggests predatory and mimetic life styles. Distributional evidence suggests that ancestral *Pyticara* evolved in highlands of South America, with only *P. championi* GORHAM crossing the Panamanian portal some 25 million years ago; to eventually attain a wide distribution in Insular Central America. A phylogeny of the species of *Pyticara* is postulated. It is computer generated with WINCLADA in consort with NONA. Also included in this work are description of species, key to species, 20 line drawings, 10 Scanning Electron Micrographs, 2 distributional maps, and 8 color habitus illustrations.

K e y w o r d s : Coleoptera, Cleridae, Enopliinae, Taxonomy, Evolution

Introduction

The genus *Pyticara* SPINOLA has not been revised collectively and its taxonomic history is riddled with misplacement of species taxa. Of the 11 nominal species of *Pyticara* listed in CORPORAAL (1950: 274), 6 are now classified under different genera. There is also an issue about the correct spelling of *Pyticara*. SPINOLA (1841: 75) noted the genus name *Pyticara* in a key to genera of *Ichnoïdes*. Then, in 1844 Spinola noted *Pyticera* (page 69) and *Pytycera* (plate 41) (CORPORAAL 1948: 244). The first misspelling was used by various subsequent authors, but none of them referenced SPINOLA (1841). These authors adopted the *Pyticera* spelling (SPINOLA 1844) presumably to be in compliance with Article 56.2 of the ICZN (1999: 58), which indicates that generic names that differ by one letter are not to be considered homonyms. However, it is clear that *Pyticera* and *Pytycera* are misspellings that according to Article 33.3 (ICZN, 1999: 42) have no nomenclatural standing or formal availability.

Part IV of the revisionary sequence of Enopliinae is preceded by Part III (OPITZ 2014c –

Revision of the New World Genus *Parapelonides* BARR), Part II (OPITZ 2014b – Taxonomic revision of the New World genus *Pelonides* KUWERT (Coleoptera: Cleridae: Enopliinae), and Part I (OPITZ 2014a –Taxonomy of the New World Genera of Enopliinae (Coleoptera: Cleridae).

Material and Methods

This study is based on the morphology of 53 adult specimens. Although morphological criteria is used to determine specific level discontinuities I adhere to the biological species concepts as discussed by STANDFUSS (1896: 115), DOBZHANSKY (1937: 312), and MAYR (1963: 16). My thought is that I have gained sufficient general knowledge about Cleridae species to make reasonable estimates of what magnitude of morphological difference may account for reproductive isolation; as discussed by the abovementioned three authors.

The principles of HENNIG (1966: 88) were followed for methodology involving supraspecific considerations, but I am in agreement with TUOMIKOSKY (1967: 138) who advocates the use of "apotypic" and "plesiotypic" instead of "apomorphic" and "plesiomorphic" on the grounds that phylogenetic work is not restricted to morphological characters (KAVANAUGH 1978). All primary types were examined and compared with the phenotypic range of the beetles before me. Line drawings were produced with a Wild M5 stereoscopic microscope with camera lucida attachment (Leica, Wetzlar, Germany). Photographs of habitus illustrations were taken with a Leica Z 16 APO microscope equipped (Leica) with JVC KY-F75U-CCD camera and controlled by Syncroscopy Auto Montage software (Cambridge, United Kingdom), then digitally printed. The SEM micrographs were produced with a Scanning Electron Microscope-S-3500N (Jeol-JSM-5510. LV, Japan). Methods for extracting the aedeagus, formulation of specific epithets, measurements, and general illustration techniques were described in Opitz (2010: 35).

Pic described *Pyticara reducta* (PIC, 1950: 8) and *Pyticara albofasciata* (PIC, 1955: 16). In doing so, he equates *P. reducta* with *Pelonides humeralis* (HORN) and *P. albofasciata* with *P. coronata* GORHAM. Unfortunately, the types representing the two Pic nominal species have not been found and hence are designated *incertae sedis*.

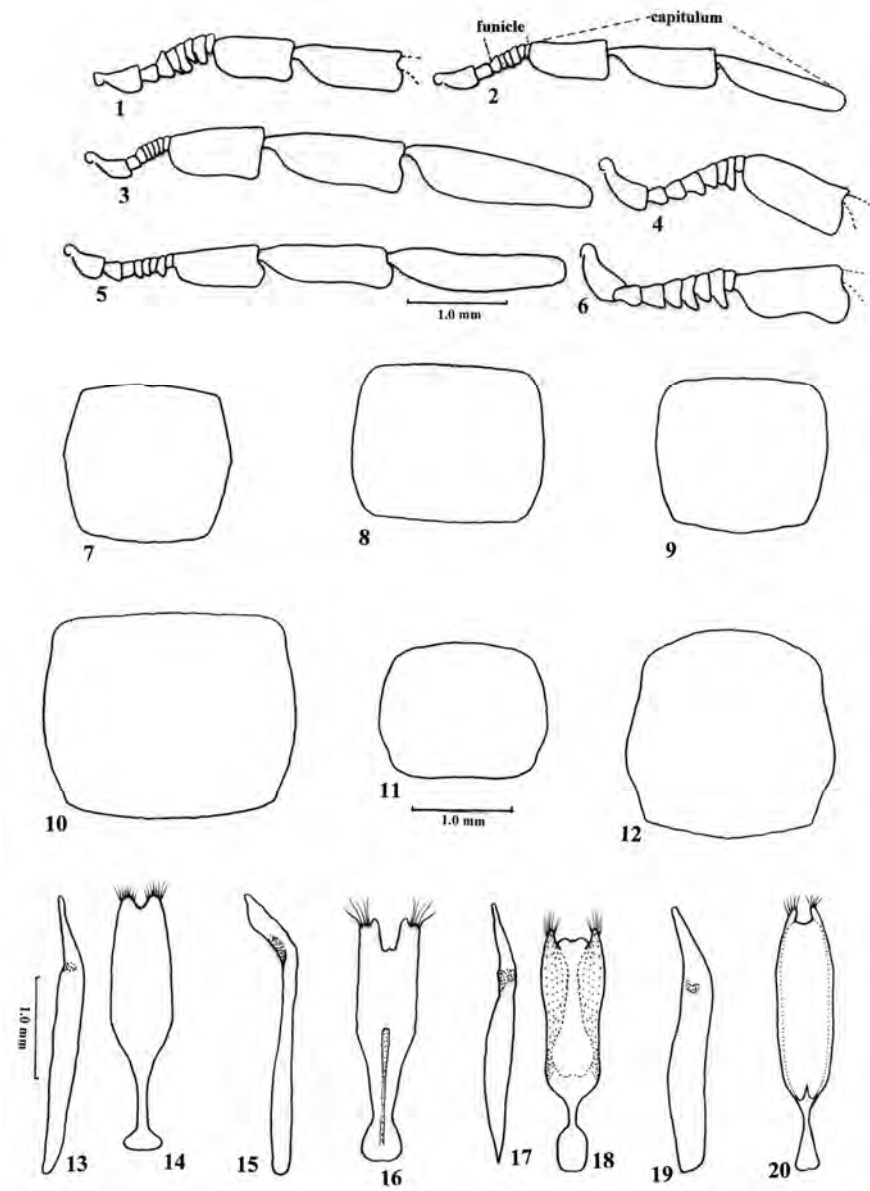
Table 1: Character matrix for 18 morphologic and 1 geographic characters of *Pyticara* species.

Taxa	Characters																		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Solervicensia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
championi	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	1
implana	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	1
duponti	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	1
batesiana	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	0	0	1
lineatohumeralis	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	0	1	0	1
simoata	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	1

Character states

Eighteen morphological and one geographical character states were used to prepare a character matrix (Table 1), which was analyzed via NONA (GOLOBOFF 2003) in combination with Winclada version 1.00.08 (NIXON 2002). The analysis resulted in a single tree (Fig. 31). The genus *Solervicensia* BARR was used as the out-group to establish the phylogenetic state of relevant characteristics. Character states assessed as "0" are considered plesiotypic while those given a value of "1" are judged apotypic. The various methods available for assessment of the evolutionary state of a characteristic were noted by EKIS (1977: 166), WATROUS & WHEELER (1981: 5), and NIXON & CARPENTER (1993: 413).

Character 0	Antennal funicle: not compacted (0); compacted (1)
Character 1	Male metatibia: without glandular pit (0); with glandular pit (1)
Character 2	Elytral asetiferous punctures: present (0); absent (1)
Character 3	1° setae: present (0); absent (1)
Character 4	Rods of spicular apodeme: not fused only at base (0); fused only at base (1)
Character 5	Head width: wider than anterior margin of pronotum (0); equal in width to anterior margin of pronotum (1)
Character 6	Pronotal color: not predominantly of one color (0); predominantly of one color (1)
Character 7	Elytral anterior margin: black (0); flavotestaceous (1)
Character 8	Elytral disc: not explanate (0); explanate (1)
Character 9	Pronotal shape: not very transverse (0); very transverse (1)
Character 10	Geographic distribution: South America (0); Insular Central America (1)
Character 11	Sculpture of elytral disc: not arenose (0); arenose (1)
Character 12	Color of epipleural margin: not partially flavotestaceous (0); partially lavotestaceous (1)
Character 13	Elytral disc pale fascia: absent (0); present (1)
Character 14	Number of protibial spines: more than one (0); one (1)
Character 15	Size of elytral fascia: large (0); small (1)
Character 16	Elytral posthumeral streak; absent (0); present (1)
Character 17	Pronotal margin: not serrate (0); serrate (1)
Character 18	Phallobasic apodeme: not explanate basally (0); explanate basally



Figs 1-20: Morphological organs of *Pyticara* species. **1-6** Antennae. (**1**) *Pyticara batesiana*; (**2**) P. duponti. (**3**) *P. championi*. (**4**) *P. implana*. (**5**) *P. lineatohumeralis*; (**6**) *P. simoata*. **7-12** Pronota. (**7**) *P. batesiana*. (**8**) *P. championi*. (**9**) *P. duponti*. (**10**) *P. implana*. (**11**) *P. lineatohumeralis*. (**12**) *P. simoata*. **13-20** Aedeagi. (**13**) *P. batesiana phallus*. (**14**) *P. batesiana tegmen*. (**15**) *P. championi phallus*. (**16**) *P. championi* tegmen. (**17**) *P. duponti* phallus. (**18**) *P. duponti* tegmen. (**19**) P. *lineatohumeralis* phallus. (**20**) *P. lineatohumeralis* phallus.

Repositories of specimens

Specimens were borrowed/deposited in the following collections: BMNH (The British Museum of Natural History, Department of Entomology, SW 5BD, London, United Kingdom; Beulah Garner). EMUS (Utah State University, Department of Biology, 5305 Old Main Hill, Logan, Utah 84322-5305; Carol D. VanDohlen). FMNH (Field Museum of Natural History, Zoology Department, Division of Insects, 1400 South Lake Shore Drive, Chicago, Illinois 60605-2496; James H. Boone). FSCA (Florida State Collection of Arthropods, Division of Plant Industry/Entomology, Florida Department of Agriculture and Consumer Services, 1911 SW 34th Street, Gainesville, Florida 32614-7100; Paul E. Skelley). GMCF (Gérard Moragues Collection, 15 Avenue Beau Plan, 13013 Marseille, France). JEWC (James E. Wappes Collection, 8734 Paisano Pass, San Antonio, Texas 78255). JNRC (Jacques Rifkind Collection, 5105 Morella Avenue, Valley Village, California 91607-3219). MNHN (Museum National d'Histoire Naturelle, Entomologie, 45 bis, Rue de Buffon, Paris (Ve), France; Antoine Mantilleri). OLML (Biology Centre of Upper Austria, Linz, Austria; Fritz Gusenleitner). WFBM (William F. Barr Entomology Museum, Department of Plant, Soil, and Entomological Sciences, University of Idaho, 606 Rayburn Street, Moscow, Idaho 83844-2339; Frank Merickel). WOPC (Weston Opitz Collection, Research Associate: Florida State Collection of Arthropods, Division of Plant Industry/Entomology, Florida Department of Services, 1911 SW 34th Street, Gainesville, Florida 32614-7100).

Taxonomy

A description of the genus *Pyticara* SPINOLA is provided in OPITZ (2014a: 369). The synapotypic characteristics that define the monophyly of the genus involve the compaction of the antennal funicle, presence of glandular pit on the male metatibiae, absence of asetiferous punctation, and rods of spicular apodeme fused at base only. This combination of characteristics will distinguish the member of this genus from other members of the New World Enopliinae.

Key to species of *Pyticara* SPINOLA

1 Head across eyes wider than anterior margin of pronotum.....2

1' Head as wide as anterior margin of pronotum 3

2(1) Pronotal disc with wide central yellow vertical streak; elytral disc without yellow post humeral streak (Brazil) (Fig. 32).....*Pyticara batesiana* (GORHAM)

2' Pronotal disc without wide central yellow vertical streak; elytral disc with yellow post humeral streak (Fig. 36) (Brazil).....*Pyticara lineatohumeralis* PIC

3(1') Sides of elytral disc very explanate (Brazil) (Fig. 37) *Pyticara simoata* OPITZ, new species

3' Sides of elytra not very explanate.....4

4(3') Anterior half of elytral disc flavotestaceous (Costa Rica, Panamá) (Fig. 33)..... .....*Pyticara championi* GORHAM

4' Anterior half of elytral disc black.....5

5(4') Anterior margin of elytra flavotestaceous (Brazil) (Fig. 35) ....*Pyticara implana* OPITZ, new species

5' Anterior margin of elytra black (Colombia, French Guiana, Ecuador, Brazil) (Figs 34, 38)..... *Pyticara duponti* SPINOLA

Description of *Pyticara* species

Pyticara batesiana (GORHAM, 1877) (Figs 1, 7, 13, 14, 32, 40)

Ichnea batesiana GORHAM, 1877: 412. Lectotype: ♂. Here designated. Amazon, Ega (Brazil) (BMNH). New combination. Gahan 1910: 68. Corporaal 1950: 270. Paralectotypes: One specimen from Amazon, Ega (BMNH).

Ichnea batesiana var. *pelonioides* GORHAM, 1877: 413. Amazonas, Santarem. New synonymy. The characteristics upon which this nominal species synonym is based fall into the range of variation of *P. batesiana.* (BMNH). GAHAN 1910: 68. CORPORAAL 1950: 270.

D i a g n o s i s : Within *Pyticara*, specimens of *P. batesiana* and the one of *P. lineatohumeralis* have midelytral fascia, but *P. batesiana* specimens do not have a posthumeral streak which is the case in the *P. lineatohumeralis* specimen.

D e s c r i p t i o n : Size: Length 10.5 mm; width 4.0 mm. Form: As in Fig. 32. Color: Cranium mostly black, venter testaceous, narrowly testaceous in vertex and behind eyes; pronotum broadly black at sides, disc with broad yellow line, pronotal anterior angles slightly testaceous; mesoscutellum testaceous; elytra bicolored, mostly black, with flavotestaceous fascia that does not reach sutural margin; legs mostly brown, basal half of femora flavotestaceous. Head: Wider than anterior margin of pronotum; antennomere 9 (Fig.1) longer than funicle; antennal carina very prominent; EW/FW 30/40. Thorax: Pronotum transverse, side margin rounded (Fig. 7); PW/PL 120/117; elytra gradually increasing in diameter from base to elytral half; EL/EW 500//160. Abdomen: Male pygidium not incised at distal margin; aedeagus as in Figs 13, 14; tegminal lobes strongly fimbriate.

V a r i a t i o n : Size: Length 9.0-13.0 mm; width 3.5-6.0 mm. The testaceous fascia on the elytral disc varies in expression.

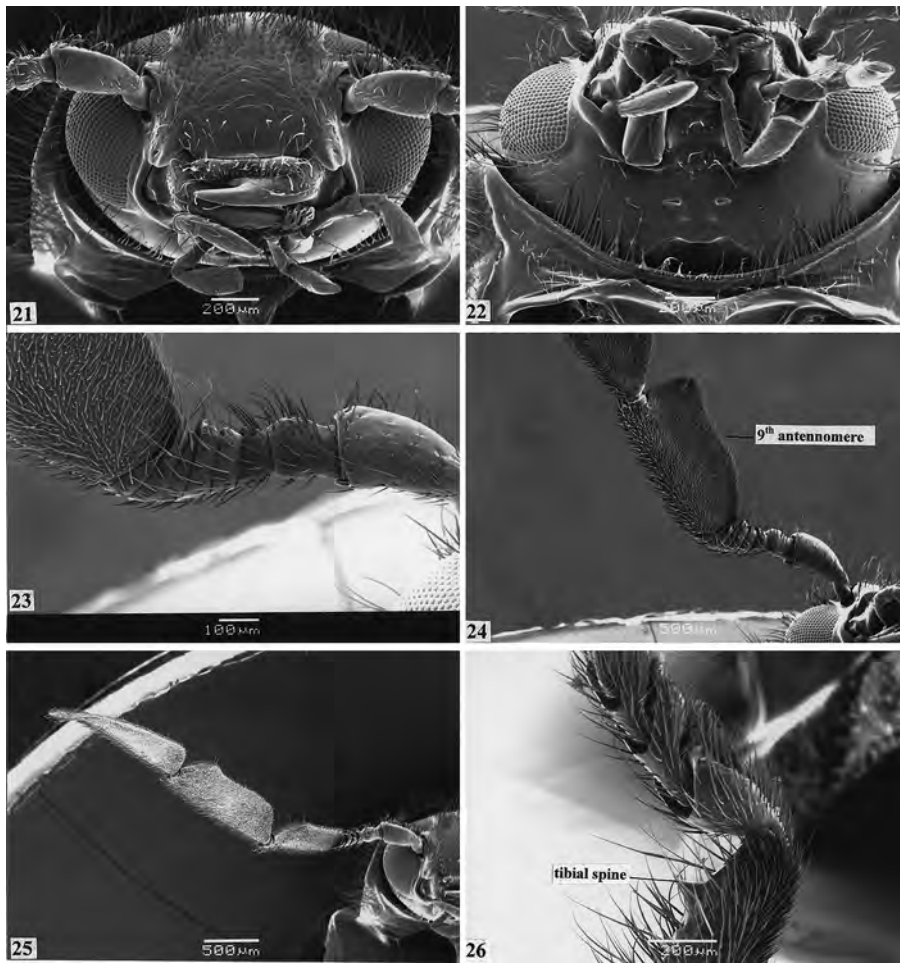
D i s t r i b u t i o n (Fig. 40): In addition to the lectotype I examined 8 specimens**.** Brazil, Pará, Jacareacanga, XII-1968, M. Alvarenga; Santarem; Ega (= Tefé). Specimens are deposited in BMNH and WOPC.

Pyticara championi GORHAM, 1883 (Figs 3, 8, 15, 16, 21-28, 30, 33, 41)

Pyticara championi GORHAM, 1883: 184. Lectotype: ♀. Here designated. S. Geronimo, Guatemala, Champion (BMNH). Corporaal 1950: 274.
Paralectotypes: Two specimens from Guatemala, San Geronimo, Champion (BMNH).

D i a g n o s i s : Within *Pyticara*, specimens of *P. championi* have the basal half of the elytra testaceous. This characteristic distinguishes the members of this species from congeners.

D e s c r i p t i o n : Size: Length 9.0 mm; width 4.5 mm. Form: As in Fig. 33. Color: Cranium mostly black, venter yellow; pronotum and mesoscutellum testaceous; elytra bicolored, testaceous in basal half, dark brown in remainder; front and middle femora flavotestaceous, hind femora brown. Head: As wide as anterior margin of pronotum (Figs 21-22); antennomere 9 (Figs 3, 23-25) longer than funicle; antennal carina very prominent; EW/FW 34/42. Thorax: As wide as anterior margin of pronotum, pronotum



Figs 21-26: Morphological organs of *Pyticara championi* GORHAM. **21-22** Heads. (**21**) Frontal view. (**22**) Ventral view. **23-25** Antennae. (**23**) Funicle. (**24**) Ninth antennomere. (**25**) Entire antenna. (**26**) Front leg.

transverse, side margin rounded (Fig. 8); PW/PL 140/112; elytra gradually increasing in diameter from base to elytral half; EL/EW 410//140; protibial spines (Fig. 26), unguis denticle (Fig. 27), secretory pit in male metatibiae (Fig. 28), and elytral pubescence (Fig. 30) well developed Abdomen: Male pygidium not incised at distal margin; aedeagus as in Figs 15, 16; tegminal lobes strongly fimbriate.

V a r i a t i o n : Size: Length 8.0-10.0 mm; width 4.0-5.0 mm. The anterior half of the elytra is sometimes infused with light brown infuscations.

N a t u r a l h i s t o r y : Specimens were collected during February, April, May, June, and August, at altitudes ranging from 0-600 m. One specimen was collected with a Malaise trap; others were collected by aspirating flowers of *Ficus insipida* WILLD.

(Moraceae) and *Jacaranda copaida* (AUBL.) D. DON. One beetle was gathered by beating blossoms of *Psychtria* L. (Rubiaceae). J. P. Donahue, C. C. Hair, N. K. Moore, and M. A. Hopkins collected a specimen of the galerucine *Monocesta depressa* CLARK (Fig. 39), undoubtedly a Batesian model for *P. championi*.

D i s t r i b u t i o n (Fig. 41): In addition to 3 syntypes I examined 13 specimens. Costa Rica, Alajuela, 20 km S Upsala, 10-29-V-1991, F. D. Parker; Heredia, Est. Biol. La Selva, 30-VI-1995, 50-150 m, 10°26' N 84°01', Proy. ALAS; Guan., 3 km SE R. Naranjo, 24-30-VIII-1993, F. D. Parker; Limón, Est Cuatro Esquinas, PN Tortuguero, 0 m, II-1993, R. Delgado; Guanacaste, Estac. Maritza, Westside Volcan Orosi, 1988, Malaise, 1-VIII-1924, 600 m. Panamá, Panamá, 8-13 N El Llano, 20-V-1987, on *Psychotria* blossoms, F. T. Hovore; 10.5 km N El Llano, 3-5-VI-1984, F. Hovore; Bayano, 3 km S Ipiti, 24-V-1992, J. E. Wappes; Parque Nacional Metropolitano, 4-VIII-1995, on *Ficus insipida*, F. Oedegaard; Colon, Fort Sherman, Fort Sherman, 9°17' N 79°59' W, 12-IV-2002, on *Jacaranda copaia*, F. Oedegaard. Specimens are deposited in BMNH, FMNH, JEWC, OLML, WFBM, and WOPC.

N o t e s : GORHAM (1883: 184) indicates that his description of this species is based on 5 specimens; only 3 syntypes have been found in the BMNH.

Pyticara duponti SPINOLA, 1844 (Figs 2, 9, 17, 18, 29, 34, 38, 40)

Pyticara duponti SPINOLA, 1844: 71. Neotype: ♀. Here selected. Nova Teutonia, Sta. Catarina, BRAZ (Brazil), 1: XII: 41, Fritz Plaumann leg. (FSCA). Corporaal 1950: 274. Ekis (now Opitz) (1975: 63).
Pyticara immarginata PIC (1950: 8)
Pyticara suturalis SCHENKLING (1906: 311)
Pyticara coronata GORHAM (1877: 416). **nov.syn.**
Pyticara flavicollis GORHAM (1877: 416). **nov.syn.**

The characteristics upon which these nominal species synonyms are based fall into the range of variation of *P. duponti* (SPINOLA).

D i a g n o s i s : Some specimens of *P. duponti* have the epipleural region yellow which is also the case in the *P. simoata* specimen. However, the epipleural region is not as explanate in the *P. duponti* beetles as it is in *P. simoata* beetles (compare Figs 34, 37, 38). Specimens of *P. duponti*, that have the elytral disc entirely brown, are similarly distinguishable from *P. simoata* specimens.

D e s c r i p t i o n : Size: Length 10.5 mm; width 4.4 mm. Form: As in Fig. 34. Color: Cranium mostly black, head venter testaceous, narrowly testaceous in vertex and behind eyes, lower frons testaceous; pronotum testaceous; mesoscutellum black; elytra bicolored, mostly black, with broadly yellow epipleural border; legs black. Head: As wide as anterior margin of pronotum; antennal funicle very compact (Fig. 2); antennomere 9 much longer than funicle; antennal carina very prominent; EW/FW 35/45. Thorax: Pronotum transverse, side margin rounded (Fig. 9); PW/PL 150/115; elytra explanate near epipleural margin, gradually increasing in diameter from base to elytral half; EL/EW 490//155; pronotal partial commissure (Fig. 29) well developed. Abdomen: Male pygidium not incised at distal margin; aedeagus as in Figs 17, 18; tegminal lobes strongly fimbriate.

V a r i a t i o n : Size: Length 13.0-11.0 mm; width 4.0-4.8 mm. The expression of testaceous regions of the cranium varies as does the coloration of the pronotal disc. The

latter may have two broad black lines on its disc. The mesoscutellum may be testaceous and the elytral disc entirely black.

N a t u r a l h i s t o r y : Specimens were collected during August, October, November, January, and February, at altitudes ranging from 250 – 400 m. They were gathered in a Malaise trap and flight intercept trap. Wilford J. Hansen captured a specimen in Rondonia, Brazil, by placing a Malaise trap over a stack of recently felled tree trunks (for photograph of this method of collecting Cleridae see OPITZ 2004: 14, Fig. 2).

D i s t r i b u t i o n (Fig. 40): I examined 20 specimens from: Colombia, 320 m, Putumayo, PNN La Paya, Canaña Viviano Cocha, 0°7'S 74°56'W, Malaise, 15-30-X-2001, R. Cobete. French Guiana, Roura, RN 2 PK 22, Magne des Cevaux, 4-I-2009, piége vitre d' interception, P. H. Dalens; Régina, Montagne de Kaw, PK 36, 10-VIII-2005, piége malaise, J. A. Cerda. Ecuador, Napo, Yasuni Research Station, 19-30-X-1998, W. J. Hanson, 250 m, 6°36'W 0°38'S Brazil, Vilhena, Rondonia, XI-1973, M. Alvarenga; Rondonia, 62 km SE Ariquemes, 8-20-XI-1994, W. J. Hansen; Rio Caraguata, Mato Grosso, XII-1953, 21°48' W 32°27'N, 400 m, Fritz Plaumann; Amazonas, Reserva Ducke, 26 km NE Manaus, Barbosa, M. G. V, Malaise; Santa Catarina, Nova Teutonia, II-1956, F. Plaumann; Amazon, Ega; Alto de Serra; Rio Madeira, Abuna, Mann & Baker; Sta. Tereza, 26-X-1964, C. Elias; Linhares, ES, 9-15-I-1975, C. Elias. Specimens are deposited in EMUS, FMNH, JNRC, GMCF, WFBM, and WOPC.

N o t e s : In 1975 I examined the Spinola collection and found no trace of the holotype of this species (EKIS 1975: 63). It has not been found in the Paris Museum. Fortunately, Spinola provided a fine illustration of the missing holotype. The description is based on a specimen that looks very similar to the aforementioned habitus illustration. However, to fix the name of this species, which is characterized by having two color morphs, I select a Neotype in conformity with Article 75 of the ICZN (1999).

***Pyticara implana* OPITZ, nov.sp. (Figs 4, 10, 35, 40)**

H o l o t y p e : ♀. Brazil: Pará: Jagareacanga, XII-1968, M. Alvarenga (FSCA).

D i a g n o s i s : Within *Pyticara*, specimens of *P. duponti*, *P. championi*, *P. implana*, and *P. simoata* have the head and the anterior margin of the pronotum equally wide, but only in *P. implana* specimens is the elytral anterior margin faintly testaceous, in an elytral disc that is otherwise entirely black.

D e s c r i p t i o n : Size: Length 14.5 mm; width 6.0 mm. Form: As in Fig. 35. Color: Forebody testaceous; mesoscutellum testaceous; elytra bicolored, mostly black, with the anterior margin and the humeral angle faintly testaceous; front femur testaceous, middle and hind femora brown; tibiae brown. Head: As wide as anterior margin of pronotum; antennal funicle moderately compacted (Fig. 4) antennomere 9 longer than funicle; antennal carina very prominent; EW/FW 45/80. Thorax: Pronotum transverse, side margin rounded (Fig. 10); PW/PL 205/170; elytral disc faintly cribrate, only slightly increasing in diameter from base to elytral half; EL/EW 600//200. Abdomen: Female pygidium not incised at distal margin.

D i s t r i b u t i o n (Fig. 40): Known only from the type locality.

E t y m o l o g y : The trivial name *implana* is a Latin adjective derived from *implanus* (= uneven). I refer to the slightly rough surface of the elytral disc.

***Pyticara lineatohumeralis* PIC, 1955 (Figs 5, 11, 19, 20, 36, 40)**

Pyticara lineatohumeralis PIC, 1955: 16. Lectotype. ♂. Here designated. Teffé (Ega) (= Tefé), Amazones, M de Mathan, 2° Trimestre, 1879 (Brazil) (MNHN).

D i a g n o s i s : Within *Pyticara*, specimens of *P. batesiana* and the one of *P. lineatohumeralis* have midelytral fascia, but on the available *P. lineatohumeralis* specimen there is a posthumeral streak, which is not the case in *P. batesiana* specimens.

D e s c r i p t i o n : Size: Length 9.0 mm; width 4.0 mm. Form: As in Fig. 36. Color: Cranium mostly black, broadly flavotestaceous behind eyes, gular region flavotestaceous; pronotal disc broadly black, flavotestaceous at sides; mesoscutellum testaceous; elytra bicolored, mostly black, with flavotestaceous fascia that extends from epipleural to sutural margins, humeral region with posteriorly directed flavotestaceous streak; legs mostly brown, basal half of femora flavotestaceous. Head: Not wider than anterior margin of pronotum; antennomere 9 (Fig. 5) longer than funicle; antennal carina very prominent; EW/FW 30/37. Thorax: Pronotum transverse, side margin rounded (Fig. 11); PW/PL 130/110; elytra gradually increasing in diameter from base to apex; EL/EW 510//120. Abdomen: Male pygidium not incised at distal margin; aedeagus as in Figs 19, 20; tegminal plates narrow, lobes strongly fimbriate.

D i s t r i b u t i o n (Fig. 40): Known only from the type locality.

***Pyticara simoata* OPITZ, nov.sp. (Figs 6, 12, 37, 40)**

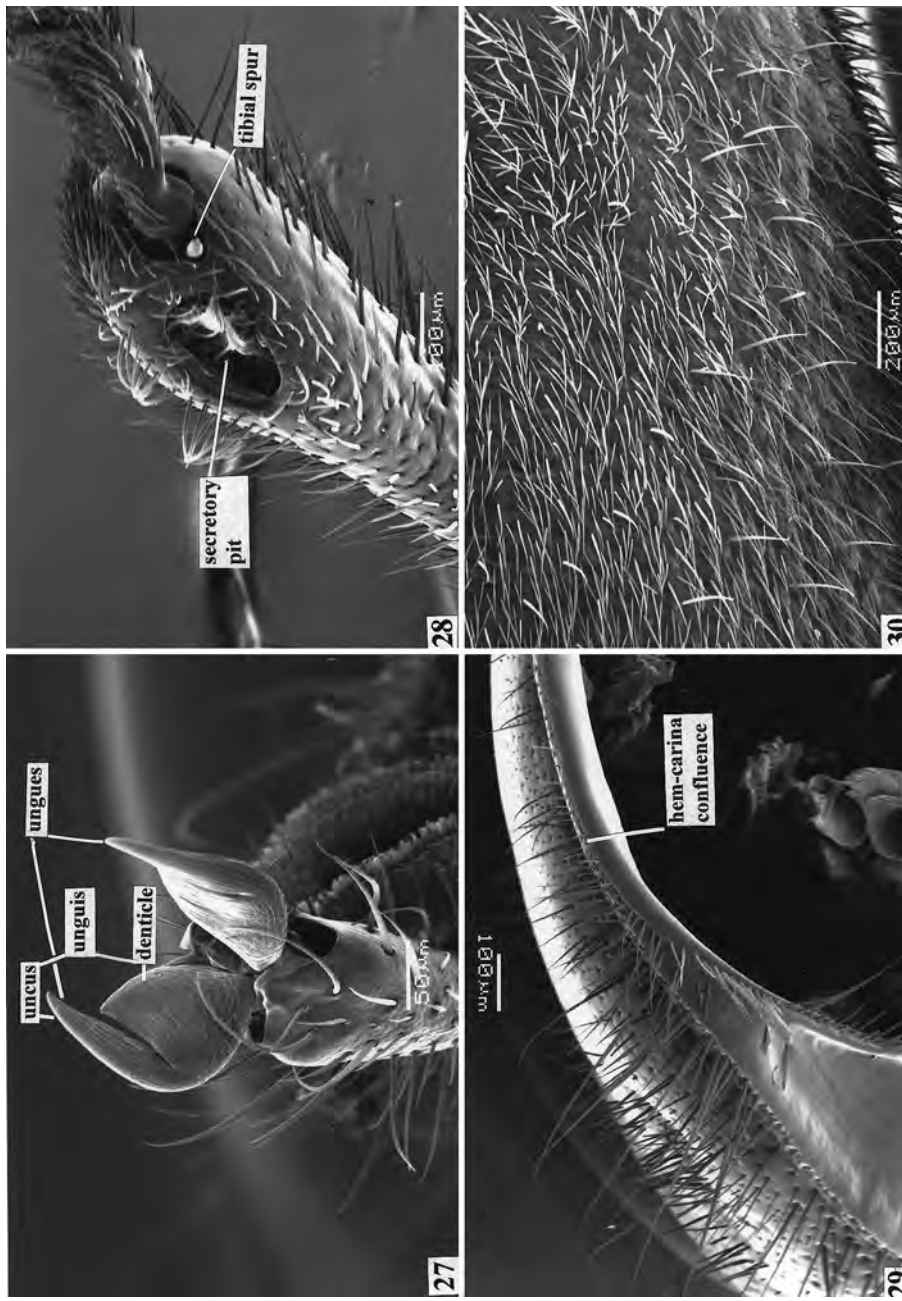
H o l o t y p e : ♀. Brazil, Cantareira, S. Paulo, 10-IX-1933, J Balik (FSCA).

D i a g n o s i s : The anterior margin of the 9th antennomere is very sinuous and the elytra are very explanate. These characteristics will distinguish the members of this species from congeners.

D e s c r i p t i o n : Size: Length 15.5 mm; width 7.0 mm. Form: As in Fig. 37. Color: Cranium black; pronotal disc mostly black, humeral angle, venter yellow; mesoscutellum black; elytral disc mostly brown, epipleural margin broadly yellow; legs black. Head: As wide as anterior margin of pronotum; antennal funicle moderately compacted (Fig. 6) antennomere 9 longer than funicle, anterior margin distinctly sinuous; antennal carina very prominent; EW/FW 45/53. Thorax: Pronotum transverse, side margin rounded (Fig. 12); PW/PL 185/170; elytral disc strongly explanate at sides, boldly increasing in diameter from base to elytral half; EL/EW 700//200. Abdomen: Female pygidium not incised at distal margin.

D i s t r i b u t i o n (Fig. 40): Known only from the type locality.

E t y m o l o g y : The trivial name *simoata* is a Latin adjective derived from *simo* (= flatten). I refer to the flat body form of this beetle.



Figs 27-30: Morphological organs of *Pyticara* species. (**27**) *Pyticara championi* front leg ungues. (**28**) *Pyticara championi*, metatibial subapical secretory pit. (**29**) *Pyticara duponti*, posterior angle of prothorax. (**30**) *Pyticara championi*, elytral disc.

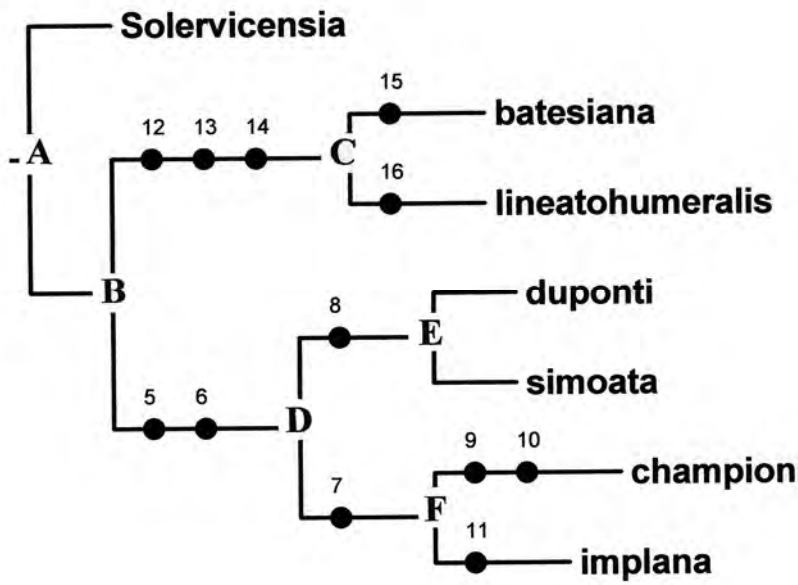


Fig. 31: Phylogenetic hypothesis of *Pyticara* species.

Evolutionary considerations

Although behavioral observations were not made, the morphology of these beetles invites speculations of predatory activities and mimicry. The mouthpart construction suggests a carnivorous life style, which is commonly found in other Cleridae with similar morphology. Moreover, the leg construction, with particular emphasis on the broad tarsal pulvilli, indicates that they probably frequent the surface of broad leaf vegetation; a likely niche scenario for these checkered beetles in view of their involvement in Batesian mimicry. For example, the galerucine chrysomelid *Monocestra depressa* CLARK (Fig. 39) is clearly a model for *Pyticara championi* (Fig. 33), whereas *Pyticara duponti* is a likely imitator of a lampyrid. Finally, an inference of carnivory is supported by the well developed proventriculus and ventriculus (OPITZ 2014a: 374) present in *Pyticara duponti* SPINOLA.

Label data indicates that these beetles are active from May to August north of the Equator, and during October to February south of the Equator. The prominent collecting techniques involve beating, aspiration from broad-leaved foliage, Malaise trap, and flight intercept trap. Altitudinally, specimens were collected from 0-600 m. Frode Ødegaard aspirated several specimens of *Pycicara championi* from canopy flowers of *Ficus insipid* WILLD. (Moraceae) and the late Frank T. Hovore collected the same species on blossoms of *Psychtria* L (Rubiaceae).

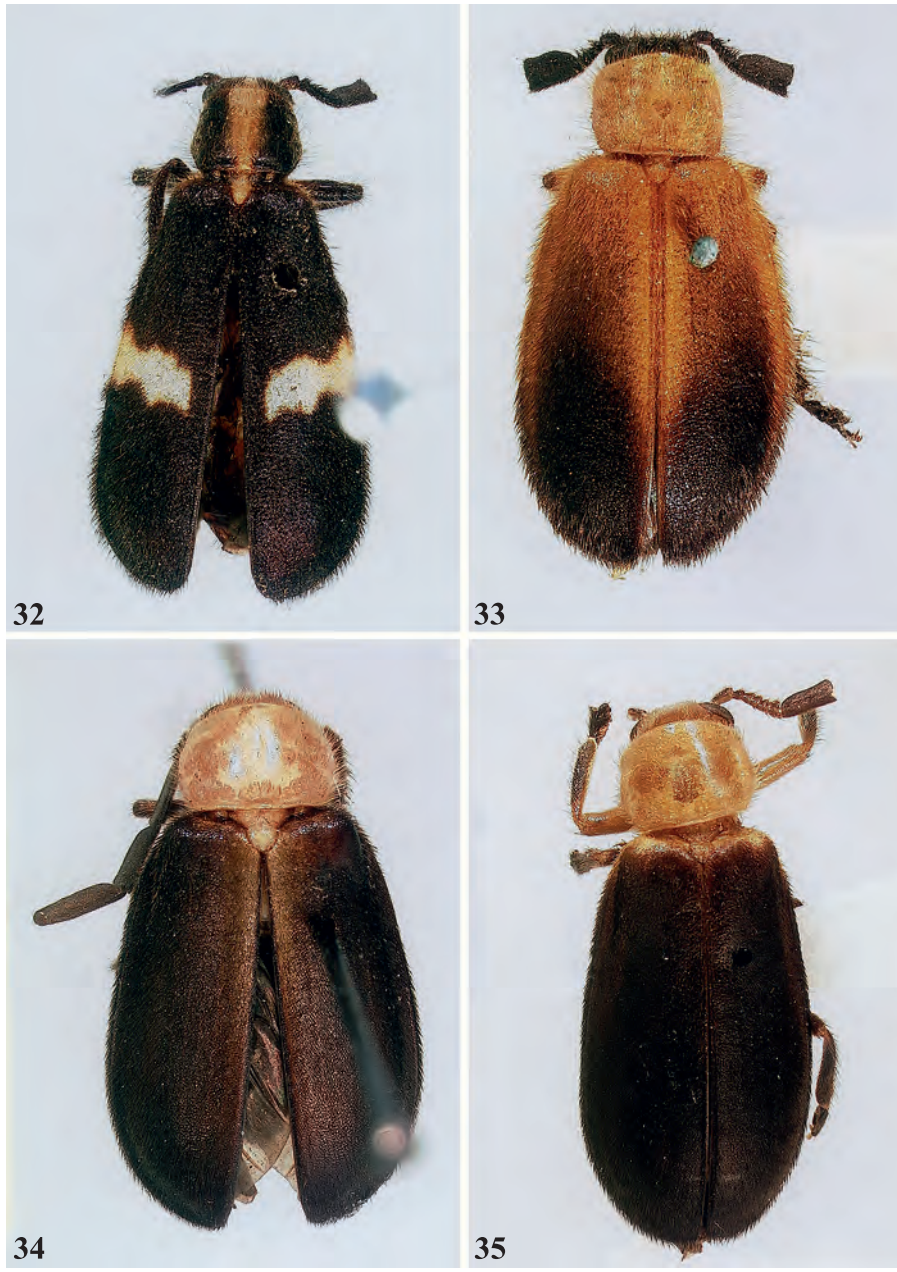
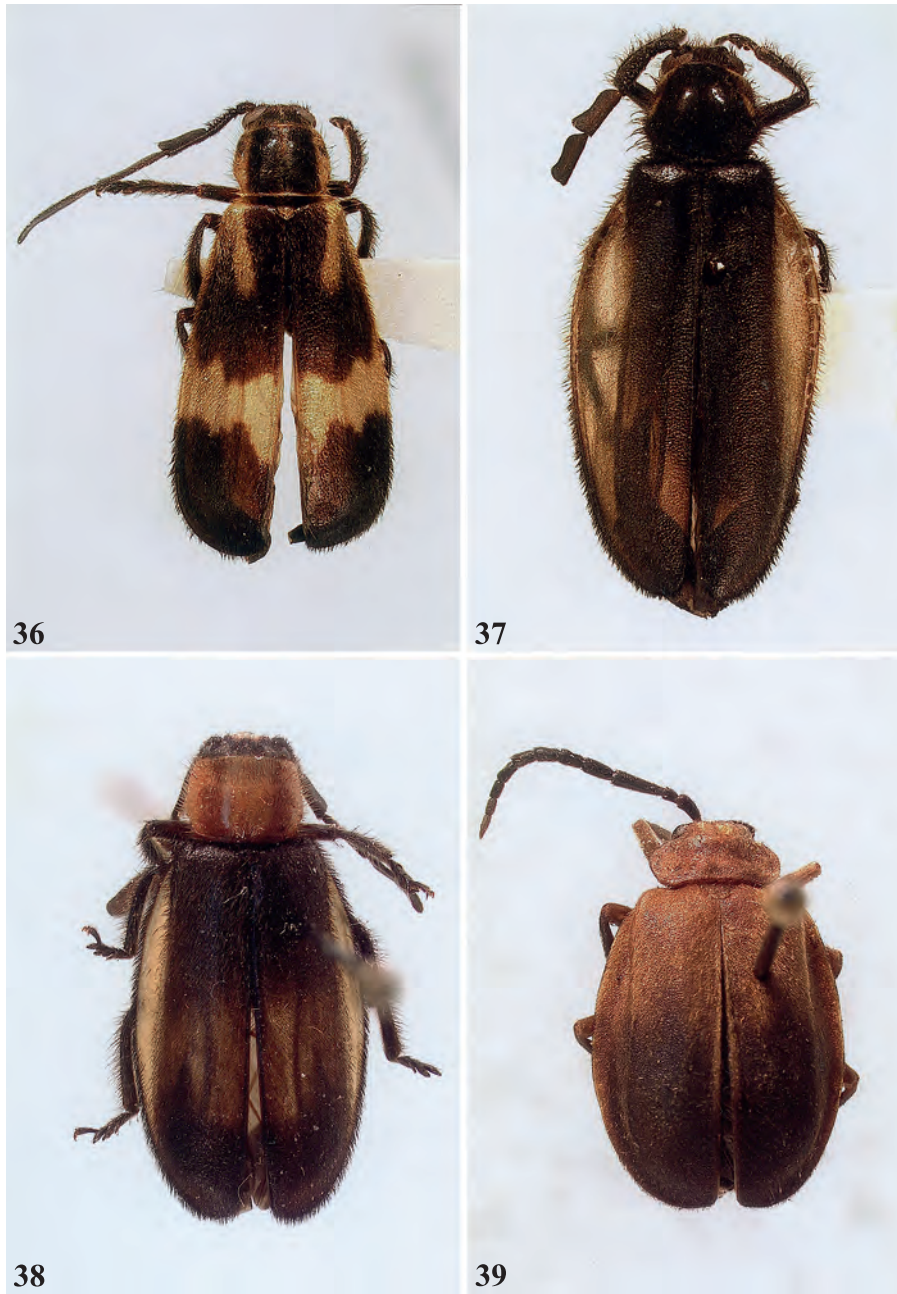


Fig. 32-35: Photographs of *Pyticara* species. (**32**) *P. batesiana*. (**33**) *P. championi*. (**34**) *P. duponti*. (**35**) *P. implana*.



Figs 36-39: Photographs of *Pyticara* and Chrysomelidae species. (**36**) *P. lineatohumeralis.* (**37**) *P. simoata.* (**38**) *P. duponti*. (**39**) Chrysomelidae: *Monocesta depressa.*

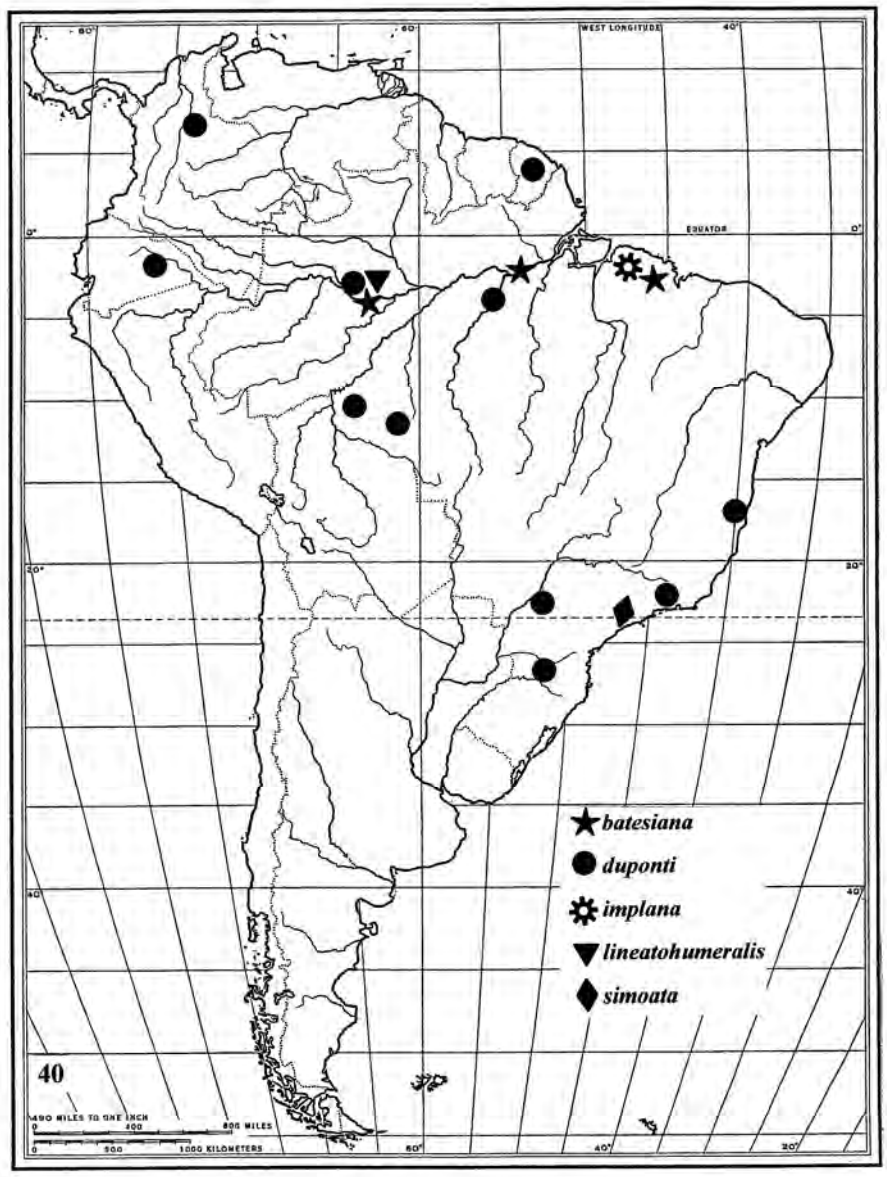


Fig. 40: Geographic distribution of species as noted.

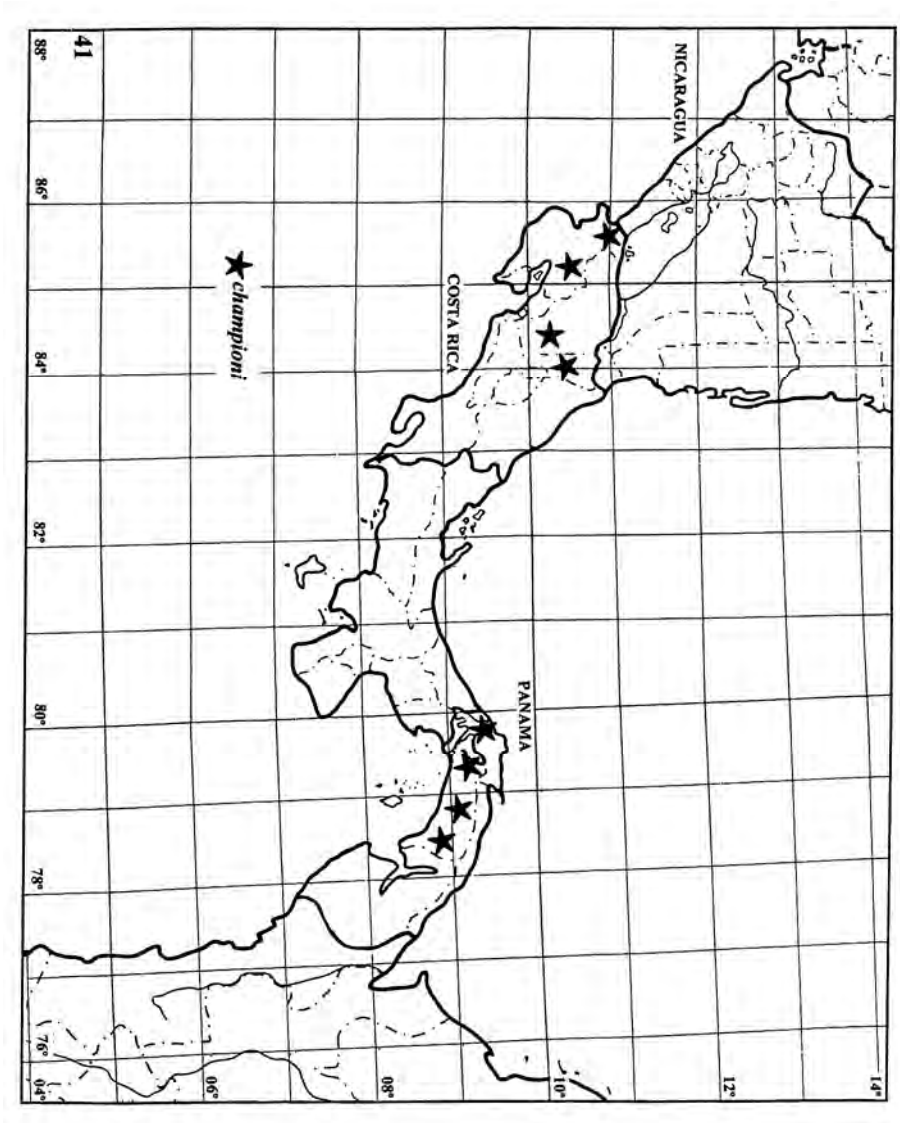


Fig. 41: Geographic distribution of *Pyticara championi*.

Distributional evidence suggests that ancestral *Pyticara* evolved in the highlands of South America. Of the six *Pyticara* species only one, *P. championi*, is found in Insular Central America (sensu OPITZ 2005: 106). Apparently, ancestral *P. championi* became widely distributed westward after the early closure of the Panamanian portal, some 25 million years ago (FORD 2006). It is also apparent that this species was unable to negotiate a more northern dispersal as it did not traverse the Nicaraguan Depression (WHITEHEAD & BALL 1977). Of particular interest is the extensive distribution of *P.*

duponti (Fig. 40), a species that is found in all six South American Clerofaunas (OPITZ 2005: 112). The high vagility of *P. duponti* may be a manifestation of a very successful mimetic life style. It is perhaps no accident that the two most mimetic species of *Pyticara* (*P. championi* and *P. duponti*) are also the two most widely distributed species in the genus. However, a collection biased could be a factor in the known distribution of the other five South American species.

The character matrix (Table 1) was analyzed via Winclada in consort with NONA. The analysis yielded one tree (L = 19, Ci = 100, Ri = 100). It is hypothesized that ancestral *Pyticara* originated in South America. The progenitor of the genus was probably characterized by having a compact antennal funicle, males evolved a metatibial glandular pit, elytral asetiferous punctations were lost, primary (1°) setae were lost, rods of the spicular apodeme became fused only at their base, and the phallobasic apodeme became explanate at its base. This ancestor (B) generated progenitor C in which the oval body form contributed to a mimetic life style, the epipleuron margin became partially flavotestaceous, the elytral disc evolved a pale fascia, and the protibial spine number was reduced to one. Ancestor C then generated *P. batesiana*, characterized by having a small elytral fascia, and *P. lineatohumeralis* in which the humeral region developed a pale streak.

Ancestor B also generated a gene pool represented by progenitor D in which the pronotum evolved predominantly one coloration. Then ancestor E evolved from D, which developed a highly explanate elytra. Progenitor E evolved *P. duponti* and *P. simoata*. Ancestral D also generated F, which produced a line that infiltrated Insular Central America and evolved into *P. championi*, characterized by having a very transverse pronotum. Ancestor F also produced the South American *P. implana*, whose elytral disc became highly arenose.

Acknowledgments

My thanks to the curators listed in the Repository of Specimens section. Thanks to my wife Galena for technical assistance and to Paul E. Skelley for providing the Electron Micrographs.

Zusammenfassung

Die Buntkäfergattung *Pyticara* SPINOLA wird zum ersten Mal revidiert; sie beinhaltet folgende Arten: *Pyticara batesiana* (GORHAM), *Pyticara championi* GORHAM, *Pyticara duponti* SPINOLA, *Pyticara implana* OPITZ, **nov.sp.**, *Pyticara lineatohumeralis* PIC und *Pyticara simoata* OPITZ, **nov.sp.** Lectotypen werden für *Pyticara batesiana*, *Pyticara championi* und *Pyticara lineatohumeralis* designiert. Drei neue Synonyme werden aufgestellt: *Ichnea batesiana* var. *pelonioides* GORHAM (= *Pyticara batesiana* GORHAM), *Pyticara coronata* GORHAM und *Pyticara flavicollis* GORHAM (= *Pyticara duponti* SPINOLA). Ein Neotypus für *P. duponti* SPINOLA wurde ausgewählt und festgelegt. Die Morphologie dieser Käfer deutet auf eine räuberische und mimetische Lebensweise hin. Verbreitungshinweise legen nahe, dass die Vorfahren von *Pyticara* in den Hochländern Südamerikas evolvierten, und nur *P. championi* GORHAM die Panama-Landbrücke vor etwa 25 Millionen Jahren überquerte, um möglicherweise eine weite Verbreitung im insularen Zentralamerika zu erreichen.

Ein phylogenetisches System der Arten der Gattung *Pyticara* wird postuliert, resultierend aus dem

Cladistikprogramm NONA in Kombination mit WINCLADA. Des weiteren beinhaltet diese Arbeit eine Beschreibung der Arten, einen Bestimmungsschlüssel zu den Arten, 20 Strichzeichnungen, 10 rasterelektronenmikroskopische Aufnahmen, 2 Verbreitungskarten und 8 farbige Habitusillustrationen.

Resumen

El género de Cleridae *Pyticara* SPINOLA es revisado por primera vez, incluye las especies siguientes: *Pyticara batesiana* (GORHAM), *Pyticara championi* GORHAM, *Pyticara duponti* SPINOLA, *Pyticara implana* OPITZ, **especie nueva**, *Pyticara lineatohumeralis* PIC, y *Pyticara simoata* OPITZ, **especie nueva. Se designan** lectotipos para *Pyticara batesiana*, *Pyticara championi*, y *Pyticara lineatohumeralis*. Se establecen tres **nuevos sinónimos**: *Ichnea batesiana var. pelonioides* GORHAM (= *Pyticara batesiana* GORHAM) y *Pyticara coronata* GORHAM junto con *Pyticara flavicollis* GORHAM (= *Pyticara duponti* SPINOLA). Se selecciona un neotipo para *P. duponti* SPINOLA. La morfología de estos coleópteros sugiere que sean depredadores y tengan un estilo de vida mimético. Los datos de distribución sugieren que un ancestro de *Pyticara* evoluciono en las montañas de Suramérica, con una sola especie, *P. championi* GORHAM, cruzando el portal Panameño hace alrededor de 25 millones de años; llegando a tener una distribución amplia en Centroamérica. Se elabora une filogenia de las especies de *Pyticara*, generada por computadora con el programa WINCLADA junto con NONA. Este trabajo también incluye la descripción de las especies, una clave de las especies, 20 dibujos, 10 fotografía con microscopia electrónica, dos mapas de distribución y 8 ilustraciones de especímenes a color.

Literature

CORPORAAL J.B. (1948): Nineteen notes on Systematics and Synonymy. — Entomologische Berichten **12**: 242-246.

CORPORAAL J.B. (1950): Cleridae. — In: HINCKS W.D. (ed.), Coleopterorum Catalogus Supplementa, Pars 23 (editio secunda). W. Junk's:'s-Gravenhage, Netherlands, 373 pp.

DOBZHANSKY T. (1937): Genetics and the origin of species. — Columbia University Press, NewYork, NY. 364 pp.

EKIS G. (1975): Taxonomic and nomenclatural status of clerid taxa described by Massimiliano Spinola (1780-1897) (Coleoptera: Cleridae). — Bolletino dell Museo di Zoologia dell' Universita di Torino **1**: 1-80.

EKIS G. (1977): Classification, Phylogeny, and Zoogeography of the Genus *Perilypus* (Coleoptera: Cleridae). — Smithsonian Contributions to Zoology **227**: 1-138.

FORD S.M. (2006): The biographic history of Mesoamerican primates [pp. 81-114]. — In: ESTRADA A.P.A., GARBER P.L., M. PAVELKA S.M. & L. LUECKE (eds), New Perspectives in the Study of Mesoamerican Primates. (Springer, New York, N.Y.

GAHAN C.J. (1910): Notes on the Cleridae and descriptions of some new genera and species of this family of Coleoptera. — Annals and Magazine of Natural History **5** (8): 55-76.

GOLOBOFF A.A. (2003): NONA version 2.0. A tree searching program. — Distributed by the author.

GORHAM H.S. (1877): Descriptions of new species of Cleridae, with notes on the genera and corrections of synonymy. — Transactions of the Royal Entomological Society of London **1877** (4): 401-426.

GORHAM H.S. (1883): Cleridae. — Biologia Centrali- Americana. Insecta, Coleoptera **3**: 169-193.

HENNIG W. (1966): Phylogenetic Systematics. — University of Illinois Press, Urbana, IL, 263 pp.

ICZN (International Commission on Zoological Nomenclature (1999): Code of Zoological Nomenclature. Fourth edition. — London: The International Trust for Zoological Nomenclature. xxix + 306 pp.

KAVANAUGH D.H. (1978): Hennigian phylogenetics in contemporary systematic: principles, methods, and uses [pp. 139-150]. — In: Biosystematics in Agriculture. Beltsville Symposia in Agricultural Research, 2. Allenheld, Osmun and Company, Halstead Press, New York, NY.

MAYR E. (1963): Animal species and evolution. — Harvard University Press, Cambridge, 797 pp.

NIXON K.C. & J.M. CARPENTER (1993): On outgroups. — Cladistics **9**: 413-426.

NIXON K.C. (2002): Winclada ver. 1.00.08. Published by the author.

OPITZ W. (2004): Classification, natural history, and evolution of the Epiphloeinae (Coleoptera: Cleridae). Part II. The genera *Chaetophloeus* OPITZ and *Plocamocera* SPINOLA. — Bulletin of the American Museum of Natural History **280**: 1-82.

OPITZ W. (2005): Classification, natural history, and evolution of the genus *Aphelocerus* KIRSCH (Coleoptera: Cleridae: Clerinae). — Bulletin of the American Museum of Natural History **293**: 1-128.

OPITZ W. (2010): Classification, natural history, phylogeny, and subfamily composition of the Cleridae and generic content of the subfamilies (Coleoptera: Cleroidea). — Entomologica Basiliensia et Collectionis Frey **32**: 31-128.

OPITZ W. (2014a): Taxonomy of the New World Genera of Enopliinae (Coleoptera: Cleridae). — Journal of the Kansas Entomological Society **87** (4): 358-384.

OPITZ W. (2014b): Taxonomic revision of the New World genus *Pelonides* KUWERT (Coleoptera: Cleridae: Enopliinae). — The Canadian Entomologist **XX**: 1-26.

OPITZ W. (2014c): Revision of the New World Genus *Parapelonides* BARR (Coleoptera: Cleridae: Enopliinae. — The Coleopterists Bulletin **68** (1): 73-81.

PIC M. (1950): Descriptions et notes varies. — Diversités entomologiques **7**: 1-16.

PIC M. (1955): Coléoptères du Globe. — L'Echange **71** (542): 16.

SCHENKLING S. (1906): Die Cleriden des Deutschen Entomologischen National-Museums, nebst Beschreibungen neuer Arten. — Deutsche Entomologische Zeitschrift **1**: 241-320.

SPINOLA M. (1841): Monographie des Térédiles. — Revue Zoologique, par La Société Cuvierienne **4**: 70-76.

SPINOLA M. (1844): Essai monographique sur les clérites. — Tome Second. Gênes: Frères Ponthenier. 216 pp., XLVII pls.

STANDFUSS M. (1896): Handbuch der paläarktischen Groß-Schmetterlinge für Forscher und Sammler. — Jena: Gustav Fischer, 392 pp.

TUOMIKOSKY R. (1967): Notes on some principles of phylogenetic systematics. — Annales Entomologici Fennici **33** (3): 137-147.

WATROUS L.E. & Q.D. WHEELER (1981): The out-group comparison method of character analysis. — Systematic Zoology **30**: 1-11.

WHITEHEAD D.R. & G.E. BALL (1997): The Middle American genus *Onyxpterygia* DEJEAN (Insecta: Coleoptera: Carabidae: Platynini): A taxonomic revision of the species, with notes about their way of life and geographic distribution. — Annals of the Carnegie Museum **66** (3): 289-409.

Author's address: Weston OPITZ
Research Associate: Florida State Collection of Arthropods
Division of Plant Industry/Entomology
Florida Department of Agriculture and Consumer Services
1911 SW 34th Street, Gainesville, Florida 32614-7100, U.S.A.
E-mail: opitz@kwu.edu